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REPORT ON  
INFORMATION HANDLING FACILITIES  
FROM  
WORKING GROUP 1 - PHASE I  
IHS STRATEGIC PLANNING EFFORT

January 19, 1982

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## Information Handling Facilities Report

### Contents

#### Section

- 1       Summary
  - Introduction
  - Conclusions
- 2       Terminal Facilities
  - Introduction
  - A Terminal For Most Agency Employees by 1990
  - Terminal Estimates
  - Office Automation
  - One Terminal-Many Systems
  - Planning for the Evolution of Terminals
  - TEMPEST - A Deterrent to Low-Cost?
  - Decentralization via Intelligent Terminals  
and Office Automation
  - Conclusions
- 3       Data Base Facilities
  - Introduction
  - Ruffing Center
  - CAMS
  - SAFE/ADSTAR
  - Do Information Systems
  - Data Base Growth
  - Conclusions
- 4       Data Transmission, Dissemination and Distribution
  - Dissemination
  - Network Facilities (MERCURY)
  - Services
  - Conclusions
- 5       Workshop Participants
  - APPENDIX A - Terminal Estimates

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## SECTION 1

## SUMMARY

## INTRODUCTION

The plan for developing the Strategic Plan for the Agency's information handling system is comprised of four phases. In the first phase a series of working groups, with a user orientation, were to meet to address and define strategic planning goals; these goals are to provide the basis for implementation strategies to be formulated in later phases. This report is the product of the Phase I Working Group concerned with Information Handling Facilities.

Information Handling Facilities were considered in three parts:

- o Terminal Facilities (including Office Automation Equipment)
- o Data Base Facilities
- o Data Transmission, Dissemination, and Distribution Facilities

This report includes a section on each of the three types of facilities, describing the highlights of the Working Group proceedings and presenting conclusions.

The conclusions in the sections include planning goals which are extracted and restated in the following paragraphs as recommended goals.

## CONCLUSIONS

Recommended planning goals are as follows:

- Goal 1-1 Provide an electronic workstation (terminal) for most Agency personnel by 1990. The goal is to have installed by 1990 approximately 8400 computer terminals (Delta Data class device) and 1900 Office Systems (word processors and distributed EDP systems).

The Working Group did a rough survey to provide the estimates for the numbers. The DO and NFAC estimates reflect the concept of one terminal for every individual, whereas the other directorates were more conservative, estimating on the order of 1 terminal for every 4 individuals.

- Goal 1-2 (a) Standardize on terminal characteristics to put the Agency in a favorable position for procuring from a competitive marketplace.

(b) Standardize on system and terminal interconnect protocols to provide for maximum flexibility and interoperability.

In order to procure terminals at the most favorable cost,

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the Agency must be sensitive to aligning its requirements with a large sector of the marketplace; buying mass produced devices in a competitive situation can mean the difference of millions of dollars and whether or not Goal 1-1 is affordable.

The level of interconnect and interoperability that will be required between terminal-to-terminal and terminal-to-host can be attained only through standardization of interconnect protocols. Requirements for one terminal connecting to multiple hosts were expressed repeatedly by Working Group members.

- Goal 2-1 Provide Data Base Management Systems (DBMS's) which are at the forefront of technology, and which have the highest potential for remaining at the forefront over the long term.

The creation, maintenance, and processing of data bases are among the most important of Agency information system capabilities. The DBMS is the cornerstone of that capability, providing the primitives and interfaces upon which many applications are dependent; Query Language, Data Dictionaries, Program Generators, Report Generators, and other tools evolve from and are tied to the DBMS. User friendly characteristics are mandatory. It is essential that the Agency be at the forefront of this technology.

- Goal 2-2 Provide administrative procedures and system information facilities to better manage one of the Agency's most valuable resources -- information.

In years to come the Agency's information resources will expand rapidly, more of the information will, be in electronic form, there will be a need to process the same information in various systems, and information will, where appropriate, be shared and utilized more widely. Administrative procedures and system facilities must be designed for this environment; dictionaries describing information resources must be automated; and standards must be promulgated for the interchange of information.

- Goal 3-1 Define the system architecture for information dissemination network.

Dissemination is one of the Agency's more advanced information handling applications requiring multiple systems to function together in a network. Architecture tenets are needed to guide system designers in treating network dependent design variables.

- Goal 3-2 Define standards for network information exchange.

The proliferation of cable formats and its impact on the cost of information handling systems exemplifies the need for standards. As new modes of information exchange are introduced, the need for standards will be even greater.

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- Goal 3-3 Define requirements for local area networking needs and develop a plan for a uniform system of local networks.

There will be increasing needs to link office systems and data processing systems in local areas. These local networks will link into wider area networks; to avoid great difficulty and cost in providing this connectivity a uniform approach is needed.

- Goal 3-4 Develop tools and methods for specifying performance objectives and validating the design of information system networks against those objectives.

In a complex network it is extremely difficult to achieve an adequate level of assurance that the performance objective of the individual systems, and the network as a whole, will be met. It is even difficult to specify the objectives. But we must begin to apply methods which will give more assurance that systems will support the operational needs when deployed. Information services must be characterized as to the performance requirements they will impose on underlying facilities. Facilities must be analyzed and modeled to validate that they will accommodate the requirements.

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## Section 2

## Terminal Facilities

## INTRODUCTION

The Working Group considered terminals in two general classes:

- o Class I - an intelligent interactive terminal of the Delta Data 7260 class.
- o Class II - an integrated office automation system of the type currently being procured (standard word processor in its most basic configuration).

The Working Group was challenged to provide: estimates on numbers of terminals by class to be installed through 1989; characterize the usage of terminals; develop planning assumptions for distributed versus centralized functionality; and determine deficiencies in current terminal programs.

Discussion points regarded as most significant are summarized in following sections, ending with conclusions.

## A TERMINAL FOR MOST AGENCY EMPLOYEES BY 1990

Serving as a basis for the discussion, the IHSA Point Paper and other planning documents, project a goal that most Agency employees will have an electronic workstation (terminal) for his personal use by the end of the decade. The IHSA Paper goes further to estimate that [ ] terminals, at a cost of more than [ ] will be required to meet this goal.

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It was suggested that there are classes of employees that will not require terminals. Examples given included FBIS newspaper readers, laboratory technicians, and certain field personnel. Yet, there was consensus that a large portion of the Agency's population would indeed require a terminal by 1990; the actual estimates developed by the Working Group and presented in the following section confirm this.

There was considerable discussion over whether the request for estimates of terminals, by organization, through the eighties, was a reasonable request; and if so, what the assumptions were to be in making such estimates. It was pointed out that the experience has been that budgetary constraints determine the number of terminals that are procured, quite independent of stated requirements; ODP in immediate years has funds for less than 30 percent of stated requirements. The counter argument was that a well conceived plan will be necessary to lift budget constraints. It was eventually agreed that Working Group members would survey their home organizations; the assumptions used and the estimates are presented below.

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## TERMINAL ESTIMATES

A summary of the estimates provided by each Directorate is provided below in Table 1. The more detailed data is included in Appendix A.

The total number of terminals (excludes NPIC and other requirements outside the CIA budget) for 1989 is estimated at [ ] devices; this includes both Office Systems (Class II) and conventional computer terminals (Class I). There are currently [ ] devices installed meaning that [ ] new terminal installations will be required over the next eight years to meet the estimates; in addition, many of the currently installed devices will have to be replaced.

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It is anticipated that the installation rate will gradually accelerate, reaching a peak in the 1985-87 time frame when major system developments become fully operational and when Office Automation has realized its potential.

It is noted that DO and NFAC fully subscribe to the idea of one terminal for every individual, whereas DS&T and DA are more conservative in their estimates. The reasons can be attributed to the charter of the organizations; these organizations are more involved in the substance of intelligence, particularly analysis, and therefore see greater individual involvement with information handling systems. Those involved in administrative and other support processes, such as program management, see information handling systems as being less integral to their working environment. Perhaps influencing this difference in perspective is the emphasis to date on systems in the operational domain, rather than the support domain.

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## OFFICE AUTOMATION

Office Automation was considered as those functions described in the current RFP for Office Automation equipment. Included are:

- o Word Processing
- o Document Storage and Retrieval
- o Electronic Mail
- o Records Management
- o Local EDP Capabilities
- o Local Networking for Office Interconnection

Working Group members were supportive of Office Automation concepts, believing that the technology has enormous potential for improving information handling processes. As a group, there was clear understanding of the application and need for word processing, and for communicating word processors - this technology is widely used in the Agency today.

There is less understanding of the other aforementioned Office Automation functions and how those functions are to be exploited. The Office Automation equipment which the Agency is about to procure offers the potential for electronically connecting every desk in the Agency, for major reduction in paper dissemination and paper files, and for data processing in the office environment. But, before this potential can be fully realized there are questions to be answered, such as: What are the applications of electronic storage and retrieval of documents in the office environment--is it cost effective--is it secure? What are the applications of electronic mail--is electronic mail to become pervasive in the Agency's conduct of its business? What EDP applications are appropriately performed at the office level?

As with any significant new systems technology, it will take years to understand and fully exploit office automation. Answers to questions will come as we deploy office systems for limited applications, such as word processing, and progress to more sophisticated applications as we learn.

It is clear that the impact of office systems will be pervasive: In the systems domain EDP Systems and Communication Systems must interface and provide interoperability; in the office domain procedures for conduct of business will be altered. What this strongly suggests is that there be increased emphasis on planning for the application of Office Automation Systems.

Other discussion points were:

- o Each of the major computer centers offer, or are developing, functions which are equivalent to those provided by Office Systems--electronic mail and word processing being the prime examples. It is assumed that there will be requirements for an end user at an office system to exchange mail, or a text file, with an end user interfaced to SAFE or the Ruffing Computer Center. NFAC, for example, will use SAFE, VM, and local office systems for mail and word processing; it is

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- o The primary reasons for the attractiveness of office systems as compared to central systems with the same function, are availability, responsiveness, and user friendliness. The balance between distributed office systems and central systems will depend heavily on improvements to central systems in these areas.
- o It was suggested that the justification for procurement of terminal equipment should be in the form of a broad based plan for automating the Agency, rather than justifying the equipment in small lots, as is the current practice for word processors.
- o There was limited discussion of other concepts often considered under office automation, such as, voice mail, teleconferencing, and voice I/O.

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modular building blocks, covering the least to the most complex configuration. The distinction between an ADP terminal (DD 7260) and a communicating Word Processor would be only in the software, with both functions being available in a properly configured terminal.

It was anticipated that Delta Data would be replaced beginning in the mid-80's; the new terminal would conform to the family concept, and offer more processing, storage, and software support. There was discussion about what impact that might have on current systems where the software tends to be coupled rather tightly to the terminal; the upshot was that system designs should be moving in the direction of implementing standard protocols which would ease the way to interfacing new terminals.

A representative from ODP indicated that there are initiatives underway to enhance the Delta Data as a local processor; this may eventually result in the micro operating system, CP/M, being available along with some of the packaged software that runs in that environment. In addition, there is an initiative to enhance host software to make the graphics capability of the 7260 useful.

## TEMPEST - A DETERRENT TO LOW-COST?

With the large quantities of terminals projected for the eighties, cost was a recurring issue. The Agency currently pays approximately [ ] for a minimum configured Delta Data terminal; some thought it should be much less, as little as [ ]. When considering thousands of terminals the differential is attention getting.

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There is clearly enormous cost leverage in procuring terminals which are mass produced for a large marketplace. The experience, however, has been that the TEMPEST requirement has been instrumental in forcing the Agency into a special and relatively small marketplace, and therefore a costly marketplace. The result is that the TEMPEST requirement can as much as double the cost of the equipment. It should be said that TEMPEST has not been the only special requirement, but it is the most intractable and one which will be with us in the long term. Perhaps a coordinated effort to focus and stimulate the marketplace would result in lower costs.

## DECENTRALIZATION VIA INTELLIGENT TERMINALS AND OFFICE AUTOMATION

As terminals expand in storage and processing capability, and as Office Automation Systems are introduced, the Agency will surely do more of its automated information handling functions in the office environment. There will be an overlap of capability between central and office systems, and choices involving complex tradeoffs will have to be made. Some of the tradeoffs are likely to be similar to those confronted in the past over the deployment of minicomputers.

It was suggested that a hybrid configuration offering both central and local facilities to the end user is an opportunity to take advantage of the best of both. The lines of demarcation are not spelled out, and perhaps it is too soon to do so, except in the most general way.

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Most members of the Working Group foresee a highly connected network of central computer systems and office equipment. There was concern over the security of such a network; a view was expressed that certain organizations would not allow their office information handling facilities to be connected to a network because of security considerations.

What is clear, is that a network of computer systems and office automation requires a high degree of interoperability where files and other information flows between systems and can be processed interchangeably, and where functions such as mail transcend system boundaries. Standard protocols, addressing the lowest communication protocols to the highest application levels, are essential to achieve such interoperability.

## CONCLUSIONS

Conclusions are derived from the above sections stated as planning goals. These goals are to be reduced to more specific objectives as planning progresses through subsequent phases.

Goal 1 - Provide an electronic workstation (terminal) for most Agency personnel by 1990. The estimates call for approximately 8400 computer terminals (Class I devices) and 1900 office systems (Class II devices) by 1990.

Goal 2 - (a) Standardize on terminal characteristics so that the Agency procures from a competitive marketplace.

(b) Standardize on system and terminal interconnect protocols to provide for maximum flexibility and interoperability.

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SECTION 3

DATA BASE FACILITIES

INTRODUCTION

It is anticipated that the eighties will bring a significant increase in demand on data base facilities. There will be requirements for more and larger data bases, for greater accessibility to data bases, and for tools to allow effective utilization of large quantities of data.

The Working Group was challenged to develop planning goals and objectives which are responsive to this anticipated demand. The Group was tasked to provide: estimates for quantities and sizes of data bases; define data base related tools; provide estimates for community data base access; and review plans for current large data base facilities.

There was particular emphasis on reviewing large programs such as SAFE since these programs represent a very large commitment to the future.

This section is organized to first summarize presentations and discussion regarding major programs; followed by data base growth, ending with conclusions.

RUFFING COMPUTER CENTER

The Working Group was briefed on status and plans for the Ruffing Computer Center, through the 1987 period.

The plan for upgrading the Center is designed to be responsive to growth rates of 20-25 percent per year in general computing. The plan shows that by gradual replacement of installed computers with newer and higher performance computers, the Center will be able to service the growth rate and still fit in the same physical space. The plan appears to be a comfortable one with little risk.

It was stated that by 1984 there is the expectation of being able to service 600-1000 simultaneous VM users.

The Center will continue to offer GIMS and RAMIS in the foreseeable future for DMBS services, GIMS for the large production applications and RAMIS for the smaller ad hoc applications. There are plans to upgrade GIMS to run under VM, and within the CAMS II Project, plans to improve GIMS performance with data base hardware. In addition, ODP has an initiative to investigate backend data base machines.

There was some concern expressed by Working Group members over the plan: One person indicated that there are not enough people to

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respond to demands for building GIMS data bases. Another expressed concern over GIMS as the standard DBMS offering, to the effect that GIMS as an industry "orphan" would not be viable over the longer term.

## CAMS

The Working Group was briefed on CAMS II plans. As a community sponsored system, it is of less concern in the Agency planning process; however, a few comments are appropriate.

CAMS II will become operational in the 1984-86 timeframe. It is to support improved collection systems, new users with new demands, and is to further integrate collection and exploitation processes.

Perhaps the most significant aspect of CAMS are requirements which are very similar to other Agency systems. For example: there are requirements for interfacing electronically to other community systems; for interactive graphics; for analyst support system including electronic mail; and for sophisticated DBMS facilities. Later planning phases may consider how to best provide functions which are generally common across several systems.

## SAFE/ADSTAR

SAFE and ADSTAR plans were presented to the Working Group. These systems are of particular interest since they represent new initiatives in information systems which will be exploited and further developed through the eighties. ADSTAR is scheduled to become operational within the next few months and the initial block of SAFE in early 1983.

The current development contract for SAFE extends through 1984 at which time the system is to have 600 terminals. It is planned that the system be extended to support 1200 terminals in the 1986 timeframe, and up to 2100 terminals by the end of the decade. Other possible initiatives for enhancing SAFE during the last half of the decade include:

- o Improved networking support: SAFE is to be coupled closely with the RCC so that the analyst can conveniently use that facility for analysis to augment SAFE capabilities. In addition, requirements for interfacing to community systems are anticipated.
- o Enhancements to support translation from paper to electronic form (OCR) for retrieval purposes.
- o Automation of biographic files.
- o Inclusion of wire services in dissemination process.
- o Interface to ADSTAR.

A major initiative is planned for ADSTAR to support up to 150 remote softcopy/hardcopy terminals, to become operational in the 86-87

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timeframe. A new communications capability for the Headquarters building and outbuildings in the Washington area for high speed image distribution will be required to support the initiative.

The response of the Working Group confirmed that the capabilities to be provided by SAFE are well conceived. It is clear that many of the information handling capabilities (compose, indexing, retrieval, presentation) are universally applicable across the Agency. As noted in other parts of this report, SAFE capabilities overlap with RCC and will overlap with Office Automation systems; there is therefore a need to fit these systems into an overall information system architecture bringing to the end user a consistent set of tools to manage and process information flowing across system boundaries.

## DO INFORMATION SYSTEMS

The Working Group received an overview briefing on DO Information Systems status and plans.

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The universality of those functions to be provided by SAFE was noted in the discussion: the major information systems in the Agency have common requirements for information storage and retrieval, and for the composition and coordination of textual information - the challenge is to limit the numbers of times these tools are implemented. The  Study will answer some of the key questions

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concerning how best to implement SAFE functions in the DO environment, and how to best exploit the investment in SAFE.

Shortcomings seen in today's Information System operation and practices that must be dealt with in the future were identified as:

- o Challenge in coping with growing volumes of traffic in electrical form.
- o Lack of budget success in funding terminals
- o System availability
- o Reluctance of people to use computers
- o Shortage of qualified people
- o Lack of Agency level planning for ADP and communications support.

## DATA BASE GROWTH

The Working Group in responding to the task of estimating data base growth over the next decade, for the most part, chose to extrapolate from past experience rather than survey their organizations. SAFE was the only area where there has been considerable attention given to quantifying the size and characteristics of data bases based on a survey of the user population and analysis of the input: more on this below.

Regarding online data storage capacity, the experience of the ODP Computer Centers has been that capacity has increased approximately 20 percent per year over the last four years. Whether this growth is fully responsive to the demand or is impacted by some of the realities of the supply side is not clear, nonetheless, the 20 percent growth rate is accepted as a reasonable planning objective. With the gradual replacement of disk devices with new technology, which is currently available, this growth rate can be sustained through 1987; beyond that time either more space for disks or a technology advancement (a likely possibility) will be required.

A representative from NFAC was able to provide estimates for data bases in the SAFE environment. Summary estimates are:  private analyst data bases for indexing, fast retrieval, and other support data; general document access index data bases of 16 million records; and a cable data base covering 10 years of traffic. In the aggregate there may be as much as 100 billion bytes of information. NFAC also has requirements for very large data bases residing on Ruffing Computer Center facilities; for example, there are 20 gigabytes of international trade data currently on magnetic tape.

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The DDA estimated five to seven new large centralized data bases over the next ten years; in addition, it is anticipated that there may be a need for 35 to 40 smaller data bases on local processors.

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It is clear that the problems of managing and extracting useful information from data bases overshadows the capacity issue. Data Base Administration came up in the discussion repeatedly in terms of how to manage our data bases so that information can be shared by larger communities; so that duplication is avoided; so that the integrity of the information is maintained; and so that records can be properly maintained. Requirements to integrate administrative data bases, concerning different aspects of personnel management, were described. Needs for data fusion, analyst tools, geographic data bases, and data base design tools were noted.

There were examples cited where organizations are becoming more aware of data base administration requirements and responding by setting up special organizations to fulfill the need; the scope of these organizations tends to be narrow however, usually related to a specific system. There is a need for data base administration functions which are more global in scope, for the purpose of managing one of the Agency's more valuable resources -- information.

## CONCLUSIONS

A good deal of time was spent reviewing major system programs, since they represent a significant commitment to the future. The reviews were informative and members of the Working Group seemed to be in general accord with the direction being taken. Perhaps the most important point which showed in the review was that the programs are working many of the same requirements with different solutions: examples included analyst support systems, data base support, and office automation; this is an issue to be considered in later phases of the planning effort.

The following long range planning goals are proposed:

- Goal 1) Provide Data Base Management Systems (DBMS's) which are at the forefront of technology and which have the highest potential for remaining at the forefront over the long term.

The creation, maintenance, and processing of data bases are among the most important of our information system capabilities. The DBMS is the cornerstone of that capability, providing the primitives and interfaces upon which many applications are dependent. Query languages, data dictionaries, program generators, report generators, and other tools evolve from and are tied to the DBMS. Therefore, it is essential that the Agency be at the forefront of this technology.

- Goal 2) Provide administrative procedures and information system facilities to better manage one of the Agency's most valuable resources--information.

In years to come the Agency's information resources will expand rapidly, more of the information will be in electronic form, there will be a need to process the same information in various systems, and information

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will be shared and utilized more widely. Administrative procedures and system facilities must be designed for this environment. Much of the information is a corporate resource--it must be managed as such. Dictionaries or catalogs describing information resources must be automated so the end user is informed on what information exists and how to access it. Standards must be promulgated for the interchange of information--so that files, messages, and documents can flow between systems.

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SECTION 4

Data Transmission, Dissemination and Distribution

INTRODUCTION

During the eighties the Agency will be challenged with providing the necessary communications and dissemination facilities to carry and disseminate increasing volumes of information to the right people in a timely manner. Trends, which will have an impact, include:

- o New overseas facilities and procedures, such as CRAFT
- o Dispersion of more terminals in the Washington area and the need for connectivity (terminal to terminal, terminal to multiple computer systems)
- o More information will be distributed in electronic form
- o New Office Automation functions such as electronic mail, teleconferencing, and shared electronic files place demands on local communications capabilities

The Working Group was challenged to:

- o Characterize and provide estimates for new operating procedures and new services which drive requirements for distribution and dissemination facilities.
- o Express strategic, or qualitative arguments which should be factored into the planning process.
- o Review current and planned programs to determine deficiencies in satisfying Agency needs through the eighties.

This section is organized to first address network facilities, followed by dissemination facilities and a discussion of services, ending with conclusions.

NETWORK FACILITIES

The Working Group was briefed on the MERCURY Program to provide an awareness of current plans to improve the Staff Communications Network. Regarding other aspects of those plans: the SKYLINK Program was not discussed; there was a small amount of discussion regarding the Washington area network.

The MERCURY Program is designed to incrementally modernize the message and data communications computer systems through the eighties. Requirements are premised on growing demand for narrative message and data communication services, and increased use of ADP Systems and office automation. Information was provided to the Working Group on

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network size and traffic handling design objectives as an attempt to provide insight into the responsiveness of MERCURY to the demands of the eighties: whereas the growth potential of MERCURY, both in the number of connections and in the amount of traffic, seem impressive, it was beyond the scope of the Working Group to provide other than a superficial assessment of the program and its ultimate impact on the IHS network.

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It was noted that MERCURY will limit any single virtual channel to a maximum rate of 64Kb--this was not taken as a cause for concern.

MERCURY will follow the ISO Open System Connection Model in implementing the communication and inter-computer protocols; the transport level of protocol will be designed to the NBS Standard.

## DISSEMINATION FACILITIES

The Working Group was briefed on the Cable Dissemination System (CDS), and on plans for the CDS replacement system (MHF). In addition, near term activities to alleviate CDS shortcomings were described.

The discussion centered on the fact that there are several systems, either in operation or planned, which are to service some part of the Agency's cable dissemination needs, and which are not well coordinated. Included are CDS/MHF, SAFE, and COMET. Present planning requires these systems to coexist in a dissemination network, where there are dependencies between them. System design requirements such as sizing, availability, data integrity, and operational control, are examples of dependent requirements which must be understood in the context of the network for the most cost effective and operationally satisfactory solutions. This line of discussion was ended with the understanding that the issues raised would be dealt with in later planning activities which are to be architecture oriented.

It was pointed out that increased reliance on automated dissemination brings with it some issues which will require attention. Included are:

- o Dissemination of non-cable traffic - there will be increasing emphasis on data traffic (e.g., files).
- o Standardization of formats - lack of standards impose a heavy burden on automated systems.
- o Security - replacement of human review processes; electronic analogs to paper privacy channels; dissemination levels.
- o Electronic origin - as more electronic traffic is originated in Headquarters Facilities, with outside addressees, different control mechanisms may be required.

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- o System Availability and Integrity - shift to electronic domain from paper places added importance to these parameters.

SERVICES

In responding to the challenge to identify services which will be of some importance during the eighties, and which will have an impact on data transmission, dissemination, and distribution facilities, the following comments are made:

- o MERCURY appears to provide the framework for satisfying the more important services to exist between Headquarters and the field. The actual transmission facilities were not considered.
- o There are needs for voice and teleconferencing services between Headquarters and the field which are not currently planned.
- o Local networks for linking Office Systems and Data Processing Systems will be of increasing importance.

CONCLUSIONS

The Working Group was able to discuss and evaluate dissemination facilities in some depth. It was less successful with distribution and transmission facilities, perhaps because these facilities are more of a second order user consideration: other system requirements more directly responsive to the users needs were more easily dealt with.

The following planning goals and objectives are highlighted as results of the Working Group proceedings:

- o Goal 1 - Define system architecture for information dissemination network.

As discussed above, there are several systems, engaged in dissemination which are to be integrated into a network of processes which need to be supportive of and consistent with one another.

- o Goal 2 - Define needed standards for network information exchange.

The proliferation of cable formats and its impact on the cost of information handling systems exemplifies the need for standards. As new modes of information exchange are introduced, the need for standards will be even greater.

- o Goal 3 - Define requirements for local area networking needs and develop a plan for a uniform system of local networks.

As indicated throughout this report, there will be increasing needs to link office systems and data processing systems in

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local areas. Even today the solutions to this problem are starting to proliferate, and because of the lack of uniformity, will eventually cause others as networks become more expansive and interwoven.

- o Goal 4 - Develop tools and methods for specifying performance objectives and validating the design of information system networks, against those objectives.

In a complex network such as the Agency's Information Handling Systems it is extremely difficult to achieve an adequate level of assurance that performance objectives of the individual systems, and the network as a whole, will be met. It is even difficult to specify the objectives. But, we must begin to apply methods which will give more assurance that systems will support the operational needs when deployed. Information services must be characterized as to the performance requirements they will impose on underlying facilities. Facilities must be analyzed and modeled to validate that they will accommodate the requirements.

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